tem-only and browser-only routines in the same library files, *Findings of Fact* ¶ ¶ 161, 164, it did not include this as a basis for tying liability despite plaintiffs' request that it do so, Plaintiffs' Proposed Findings of Fact, ¶ ¶ 131–32, *reprinted in* 2 J.A. at 941–47.

There are four elements to a per se tying violation: (1) the tying and tied goods are two separate products; (2) the defendant has market power in the tying product market; (3) the defendant affords consumers no choice but to purchase the tied product from it; and (4) the tying arrangement forecloses a substantial volume of commerce. *See Eastman Kodak Co. v. Image Tech. Servs., Inc.*, 504 U.S. 451, 461–62 (1992); *Jefferson Parish Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 12–18 (1984).

Microsoft does not dispute that it bound Windows and IE in the four ways the District Court cited. Instead it argues that Windows (the tying good) and IE browsers (the tied good) are not "separate products," Appellant's Opening Br. at 69–79, and that it did not substantially foreclose competing browsers from the tied product market, *id.* at 79–83. (Microsoft also contends that it does not have monopoly power in the tying product market, *id.* at 84–96, but, for reasons given in Section II.A, we uphold the District Court's finding to the contrary.)

We first address the separate-products inquiry, a source of much argument between the parties and of confusion in the cases. Our purpose is to highlight the poor fit between the separate-products test and the facts of this case. We then offer further reasons for carving an exception to the per se rule when the tying product is platform software. In the final section we discuss the District Court's inquiry if plaintiffs pursue a rule of reason claim on remand.

A. Separate-Products Inquiry Under the Per Se Test

The requirement that a practice involve two separate products before being condemned as an illegal tie started as a purely linguistic requirement: unless products are separate, one cannot be "tied" to the other. Indeed, the nature of the products involved in early tying cases—intuitively distinct items such as a movie projector and a film, *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502 (1917)—led courts either to disregard the separate-products question, *see, e.g.*, *United Shoe Mach. Corp. v. United States*, 258 U.S. 451 (1922), or to discuss it only in passing, *see, e.g.*, *Motion Picture Patents*, 243 U.S. at 508, 512, 518. It was not until *Times-Picayune Publishing Co. v. United States*, 345 U.S. 594 (1953), that the separate-products issue became a distinct element of the test for an illegal tie. *Id.* at 614. Even that case engaged in a rather cursory inquiry into whether ads sold in the morning edition of a paper were a separate product from ads sold in the evening edition.

The first case to give content to the separate-products test was *Jefferson Parish*, 466 U.S. 2. That case addressed a tying arrangement in which a hospital conditioned surgical care at its facility on the purchase of anesthesiological services from an affiliated medical group. The facts were a challenge for casual separate-products analysis because the tied service—anesthesia—was neither intuitively distinct from nor intuitively contained within the tying service—surgical care. A further complication was that, soon after the Court enunciated the per se rule for tying liability in *International Salt Co. v. United States*, 332 U.S. 392, 396 (1947), and *Northern Pacific Railway Co. v. United States*, 356 U.S. 1, 5–7 (1958), new economic research began to cast doubt on the assumption, voiced by the Court when it established the rule, that " 'tying agreements serve hardly any purpose beyond the suppression of competition,' " *id.* at 6 (quoting *Standard Oil of Cal. v. United States*, 337 U.S. 293, 305–06 (1949)); *see also Jefferson Parish*, 466 U.S. at 15 n.23 (citing materials); *Fortner Enters. v. U.S. Steel Corp.*, 394 U.S. 495, 524–25 (1969) (Fortas, J., dissenting) ("*Fortner I*").

The *Jefferson Parish* Court resolved the matter in two steps. First, it clarified that "the answer to the question whether one or two products are involved" does not turn "on the functional relation between them. . . ." *Jefferson Parish*, 466 U.S. at 19; *see also id.* at 19 n.30. In other words, the mere fact that two items are complements, that "one . . . is useless without the other," *id.*, does not make them a single "product" for purposes of tying law. *Accord Eastman Kodak*, 504 U.S. at 463. Second, reasoning that the "definitional question [whether two distinguishable products are involved] depends on whether the arrangement may have the type of competitive consequences addressed by the rule [against tying]," *Jefferson Parish*, 466 U.S. at 21, the Court decreed that "no tying arrangement can exist unless there is a sufficient *demand* for the purchase of anesthesiological services separate from hospital services to identify a distinct product market in which it is *efficient* to offer anesthesiological services separately from hospital service," *id.* at 21–22 (emphasis added); *accord Eastman Kodak*, 504 U.S. at 462.

The Court proceeded to examine direct and indirect evidence of consumer demand for the tied product separate from the tying product. Direct evidence addresses the question whether, when given a choice, consumers purchase the tied good from the tying good maker, or from other firms. The Court took note, for example, of testimony that patients and surgeons often requested specific anesthesiologists not associated with a hospital. *Jefferson Parish*, 466 U.S. at 22. Indirect evidence includes the behavior of firms without market power in the tying good market, presumably on the notion that (competitive) supply follows demand. If competitive firms always bundle the tying and tied goods, then they are a single product. *See id.* at 22 n.36; *see also Eastman Kodak*, 504 U.S. at 462; *Fortner I*, 394 U.S. at 525 (Fortas, J., dissenting), *cited in Jefferson Parish*, 466 U.S. at 12, 22 n.35; *United States v. Jerrold Elecs. Corp.*, 187 F. Supp. 545, 559 (E.D. Pa. 1960), *aff'd per curiam*, 365 U.S. 567 (1961); 10 PHILLIP E. AREEDA ET AL., ANTITRUST LAW ¶ 1744, at 197–201 (1996). Here the Court noted that only 27% of anesthesiologists in markets other than the defendant's had financial relationships with hospitals, and that, unlike radiologists and pathologists, anesthesiologists were not usually employed by hospitals, *i.e.*, bundled with hospital services. *Jefferson Parish*, 466 U.S. at 22 n.36. With both direct and indirect evidence concurring, the Court determined that hospital surgery and anesthesiological services were distinct goods.

To understand the logic behind the Court's consumer demand test, consider first the postulated harms from tying. The core concern is that tying prevents goods from competing directly for consumer choice on their merits, *i.e.*, being selected as a result of "buyers' independent judgment," *id.* at 13 (internal quotes omitted). With a tie, a buyer's "freedom to select the best bargain in the second market [could be] impaired by his need to purchase the tying product, and perhaps by an inability to evaluate the true cost of either product. . . ." *Id.* at 15. Direct competition on the merits of the tied product is foreclosed when the tying product either is sold only in a bundle with the tied product or, though offered separately, is sold at a bundled price, so that the buyer pays the same price whether he takes the tied product or not. In both cases, a consumer buying the tying product becomes entitled to the tied product; he will therefore likely be unwilling to buy a competitor's version of the tied product even if, making his own price/quality assessment, that is what he would prefer.

But not all ties are bad. Bundling obviously saves distribution and consumer transaction costs. 9 PHILLIP E. AREEDA, ANTITRUST LAW ¶ 1703g2, at 51–52 (1991). This is likely to be true, to take some examples from the computer industry, with the integration of math co-processors and memory into microprocessor chips and the inclusion of spell checkers in word processors. 11/10/98 pm Tr. at 18–19 (trial testimony of Steven McGeady of Intel), *reprinted in* 9 J.A. at 5581–82 (math co-processor); *Cal. Computer Prods., Inc. v. IBM Corp.*, 613 F.2d 727, 744 & n.29 (9th Cir. 1979) (memory). Bundling can also capitalize on certain economies of scope. A possible example is the "shared" library files that perform OS and browser functions with the very same lines of code and thus may save drive space from the clutter of redundant routines and memory when consumers use both the OS and browser simultaneously. 11/16/98 pm Tr. at 44 (trial testimony of Glenn Weadock), *reprinted in* 9 J.A. at 5892; Direct Testimony of Microsoft's James Allchin ¶ ¶ 10, 97, 100, 106–

116, app. A (excluding ¶¶ f, g.vi), *reprinted in* 5 J.A. at 3292, 3322–30, 3412–17. Indeed, if there were no efficiencies from a tie (including economizing on consumer transaction costs such as the time and effort involved in choice), we would expect distinct consumer demand for each individual component of every good. In a competitive market with zero transaction costs, the computers on which this opinion was written would only be sold piecemeal—keyboard, monitor, mouse, central processing unit, disk drive, and memory all sold in separate transactions and likely by different manufacturers.

Recognizing the potential benefits from tying, *see Jefferson Parish*, 466 U.S. at 21 n.33, the Court in *Jefferson Parish* forged a separate-products test that, like those of market power and substantial foreclosure, attempts to screen out false positives under per se analysis. The consumer demand test is a rough proxy for whether a tying arrangement may, on balance, be welfare-enhancing, and unsuited to per se condemnation. In the abstract, of course, there is always direct separate demand for products: assuming choice is available at zero cost, consumers will prefer it to no choice. Only when the efficiencies from bundling are dominated by the benefits to choice for enough consumers, however, will we actually observe consumers making independent purchases. In other words, perceptible separate demand is inversely proportional to net efficiencies. On the supply side, firms without market power will bundle two goods only when the cost savings from joint sale outweigh the value consumers place on separate choice. So bundling by all competitive firms implies strong net efficiencies. If a court finds either that there is no noticeable separate demand for the tied product or, there being no convincing direct evidence of separate demand, that the entire "competitive fringe" engages in the same behavior as the defendant, 10 AREEDA ET AL., ANTITRUST LAW ¶ 1744c4, at 200, then the tying and tied products should be declared one product and per se liability should be rejected.

Before concluding our exegesis of *Jefferson Parish*'s separate-products test, we should clarify two things. First, *Jefferson Parish* does not endorse a direct inquiry into the efficiencies of a bundle. Rather, it proposes easy-to-administer proxies for net efficiency. In describing the separate-products test we discuss efficiencies only to explain the rationale behind the consumer demand inquiry. To allow the separate-products test to become a detailed inquiry into possible welfare consequences would turn a screening test into the very process it is expected to render unnecessary. 10 AREEDA ET AL., ANTITRUST LAW ¶ ¶ 1741b & c, at 180–85; *see also Jefferson Parish*, 466 U.S. at 34–35 (O'Connor, J., concurring).

Second, the separate-products test is not a one-sided inquiry into the cost savings from a bundle. Although *Jefferson Parish* acknowledged that prior lower court cases looked at cost-savings to decide separate products, *see id.* at 22 n.35, the Court conspicuously did not adopt that approach in its disposition of tying arrangement before it. Instead it chose proxies that balance costs savings against reduction in consumer choice.

With this background, we now turn to the separate-products inquiry before us. The District Court found that many consumers, if given the option, would choose their browser separately from the OS. *Findings of Fact* ¶ 151 (noting that "corporate consumers . . . prefer to standardize on the same browser across different [OSs]" at the workplace). Turning to industry custom, the court found that, although all major OS vendors bundled browsers with their OSs, these companies either sold versions without a browser, or allowed OEMs or end-users either not to install the bundled browser or in any event to "uninstall" it. *Id.* ¶ 153. The court did not discuss the record evidence as to whether OS vendors other than Microsoft sold at a bundled price, with no discount for a browserless OS, perhaps because the record evidence on the issue was in conflict. *Compare, e.g.*, Direct Testimony of Richard Schmalensee ¶ 241, *reprinted in* 7 J.A. at 4315 ("[A]ll major operating system vendors do in fact include Web-browsing software with the operating system at *no extra charge*.") (emphasis added), *with, e.g.*, 1/6/99 pm Tr. at 42 (trial testimony of Franklin Fisher of MIT) (suggesting all OSs but Microsoft offer discounts).

Microsoft does not dispute that many consumers demand alternative browsers. But on industry custom Microsoft contends that no other firm requires non-removal because no other firm has invested the resources to integrate web browsing as deeply into its OS as Microsoft has. Appellant's Opening Br. at 25; *cf.* Direct Testimony of James Allchin ¶¶ 262–72, *reprinted in* 5 J.A. at 3385–89 (Apple, IBM); 11/5/98 pm Tr. at 55–58 (trial testimony of Apple's Avadis Tevanian, Jr.), *reprinted in* 9 J.A. at 5507–10 (Apple). (We here use the term "integrate" in the rather simple sense of converting individual goods into components of a single physical object (*e.g.*, a computer as it leaves the OEM, or a disk or sets of disks), without any normative implication that such integration is desirable or achieves special advantages. *Cf. United States v. Microsoft Corp.*, 147 F.3d 935, 950 (D.C. Cir. 1998) ("*Microsoft II*").) Microsoft contends not only that its integration of IE into Windows is innovative and beneficial but also that it requires non-removal of IE. In our discussion of monopoly maintenance we find that these claims fail the efficiency balancing applicable in that context. But the separate-products analysis is supposed to perform its function as a proxy *without* embarking on any direct analysis of efficiency. Accordingly, Microsoft's implicit argument—that in this case looking to a competitive fringe is inadequate to evaluate fully its potentially innovative technological integration, that such a comparison is between apples and oranges—poses a legitimate objection to the operation of *Jefferson Parish*'s separate-products test for the per se rule.

In fact there is merit to Microsoft's broader argument that *Jefferson Parish*'s consumer demand test would "chill innovation to the detriment of consumers by preventing firms from integrating into their products new functionality previously provided by standalone products—and hence, by definition, subject to separate consumer demand." Appellant's Opening Br. at 69. The per se rule's direct consumer demand and indirect industry custom inquiries are, as a general matter, backward-looking and therefore systematically poor proxies for overall efficiency in the presence of new and innovative integration. *See* 10 AREEDA ET AL., ANTITRUST LAW ¶ 1746, at 224–29; Amicus Brief of Lawrence Lessig at 24–25, and sources cited therein (brief submitted regarding Conclusions of Law). The direct consumer demand test focuses on historic consumer behavior, likely before integration, and the indirect industry custom test looks at firms that, unlike the defendant, may not have integrated the tying and tied goods. Both tests compare incomparables—the defendant's decision to bundle in the presence of integration, on the one hand, and consumer and competitor calculations in its absence, on the other. If integration has efficiency benefits, these may be ignored by the *Jefferson Parish* proxies. Because one cannot be sure beneficial integration will be protected by the other elements of the per se rule, simple application of that rule's separate-products test may make consumers worse off.

In light of the monopoly maintenance section, obviously, we do not find that Microsoft's integration is welfare-enhancing or that it should be absolved of tying liability. Rather, we heed Microsoft's warning that the separate-products element of the per se rule may not give newly integrated products a fair shake.

B. Per Se Analysis Inappropriate for this Case.

We now address directly the larger question as we see it: whether standard per se analysis should be applied "off the shelf" to evaluate the defendant's tying arrangement, one which involves software that serves as a platform for third-party applications. There is no doubt that "[i]t is far too late in the history of our antitrust jurisprudence to question the proposition that *certain* tying arrangements pose an unacceptable risk of stifling competition and therefore are unreasonable *'per se.'*" *Jefferson Parish*, 466 U.S. at 9 (emphasis added). But there are strong reasons to doubt that the integration of additional software functionality into an OS falls among these arrangements. Applying per se analysis to such an amalgamation creates undue risks of error and of deterring welfare-enhancing innovation.

The Supreme Court has warned that " '[i]t is only after considerable experience with certain business relationships that courts classify them as *per se* violations. . . .' " *Broad. Music*, 441 U.S. at 9 (quoting *Topco Assocs.*, 405 U.S. at 607–08); *accord Cont'l T.V., Inc. v. GTE Sylvania Inc.*, 433 U.S. 36, 47–59 (1977); *White Motor Co. v. United States*, 372 U.S. 253, 263 (1963); *Jerrold Elecs.*, 187 F. Supp. at 555–58, 560–61; *see also* Frank H. Easterbrook, *Allocating Antitrust Decisionmaking Tasks*, 76 GEO. L.J. 305, 308 (1987). Yet the sort of tying arrangement attacked here is unlike any the Supreme Court has considered. The early Supreme Court cases on tying dealt with arrangements whereby the sale or lease of a patented product was conditioned on the purchase of certain unpatented products from the patentee. *See Motion Picture Patents*, 243 U.S. 502 (1917); *United Shoe Mach.*, 258 U.S. 451 (1922); *IBM Corp. v. United States*, 298 U.S. 131 (1936); *Int'l Salt*, 332 U.S. 392 (1947). Later Supreme Court tying cases did not involve market power derived from patents, but continued to involve contractual ties. *See Times–Picayune*, 345 U.S. 594 (1953) (defendant newspaper conditioned the purchase of ads in its evening edition on the purchase of ads in its morning edition); *N. Pac. Ry.*, 356 U.S. 1 (1958) (defendant railroad leased land only on the condition that products manufactured on the land be shipped on its railways); *United States v. Loew's Inc.*, 371 U.S. 38 (1962) (defendant distributor of copyrighted feature films conditioned the sale of desired films on the purchase of undesired films); *U.S. Steel Corp. v. Fortner Enters., Inc.*, 429 U.S. 610 (1977) ("*Fortner II*") (defendant steel company conditioned access to low interest loans on the purchase of the defendant's prefabricated homes); *Jefferson Parish*, 466 U.S. 2 (1984) (defendant hospital conditioned use of its operating rooms on the purchase of anesthesiological services from a medical group associated with the hospital); *Eastman Kodak*, 504 U.S. 451 (1992) (defendant photocopying machine manufacturer conditioned the sale of replacement parts for its machines on the use of the defendant's repair services).

In none of these cases was the tied good physically and technologically integrated with the tying good. Nor did the defendants ever argue that their tie improved the value of the tying product to users *and* to makers of complementary goods. In those cases where the defendant claimed that use of the tied good made the tying good more valuable to users, the Court ruled that the same result could be achieved via quality standards for substitutes of the tied good. *See, e.g., Int'l Salt*, 332 U.S. at 397–98; *IBM*, 298 U.S. at 138–40. Here Microsoft argues that IE and Windows are an integrated physical product and that the bundling of IE APIs with Windows makes the latter a better applications platform for third-party software. It is unclear how the benefits from IE APIs could be achieved by quality standards for different browser manufacturers. We do not pass judgment on Microsoft's claims regarding the benefits from integration of its APIs. We merely note that these and other novel, purported efficiencies suggest that judicial "experience" provides little basis for believing that, "because of their pernicious effect on competition and lack of *any* redeeming virtue," a software firm's decisions to sell multiple functionalities as a package should be "conclusively presumed to be unreasonable and therefore illegal without elaborate inquiry as to the precise harm they have caused or the business excuse for their use." *N. Pac. Ry.*, 356 U.S. at 5 (emphasis added).

Nor have we found much insight into software integration among the decisions of lower federal courts. Most tying cases in the computer industry involve bundling with hardware. *See, e.g., Digital Equip. Corp. v. Uniq Digital Techs., Inc.*, 73 F.3d 756, 761 (7th Cir. 1996) (Easterbrook, J.) (rejecting with little discussion the notion that bundling of OS with a computer is a tie of two separate products); *Datagate, Inc. v. Hewlett–Packard Co.*, 941 F.2d 864, 870 (9th Cir. 1991) (holding that plaintiff's allegation that defendant conditioned its software on purchase of its hardware was sufficient to survive summary judgment); *Digidyne Corp. v. Data Gen. Corp.*, 734 F.2d 1336, 1341–47 (9th Cir. 1984) (holding that defendant's conditioning the sale of its OS on the purchase of its CPU constitutes a per se tying violation); *Cal. Computer*

Prods., 613 F.2d at 743–44 (holding that defendant's integration into its CPU of a disk controller designed for its own disk drives was a useful innovation and not an impermissible attempt to monopolize); *ILC Peripherals Leasing Corp. v. IBM Corp.*, 448 F. Supp. 228, 233 (N.D. Cal. 1978) (finding that defendant's integration of magnetic disks and a head/disk assembly was not an unlawful tie), *aff'd per curiam sub. nom. Memorex Corp. v. IBM Corp.*, 636 F.2d 1188 (9th Cir. 1980); *see also Transamerica Computer Co. v. IBM Corp.*, 698 F.2d 1377, 1382–83 (9th Cir. 1983) (finding lawful defendant's design changes that rendered plaintiff peripheral maker's tape drives incompatible with the defendant's CPU). The hardware case that most resembles the present one is *Telex Corp. v. IBM Corp.*, 367 F. Supp. 258 (N.D. Okla. 1973), *rev'd on other grounds*, 510 F.2d 894 (10th Cir. 1975). Just as Microsoft integrated web browsing into its OS, IBM in the 1970s integrated memory into its CPUs, a hardware platform. A peripheral manufacturer alleged a tying violation, but the District Court dismissed the claim because it thought it inappropriate to enmesh the courts in product design decisions. *Id.* at 347. The court's discussion of the tying claim was brief and did not dwell on the effects of the integration on competition or efficiencies. Nor did the court consider whether per se analysis of the alleged tie was wise.

We have found four antitrust cases involving arrangements in which a software program is tied to the purchase of a software platform—two district court cases and two appellate court cases, including one from this court. The first case, *Innovation Data Processing, Inc. v. IBM Corp.*, 585 F. Supp. 1470 (D.N.J. 1984), involved an allegation that IBM bundled with its OS a utility used to transfer data from a tape drive to a computer's disk drive. Although the court mentioned the efficiencies achieved by bundling, it ultimately dismissed the per se tying claim because IBM sold a discounted version of the OS without the utility. *Id.* at 1475–76. The second case, *A.I. Root Co. v. Computer/Dynamics, Inc.*, 806 F.2d 673 (6th Cir. 1986), was brought by a business customer who claimed that an OS manufacturer illegally conditioned the sale of its OS on the purchase of other software applications. The court quickly disposed of the case on the ground that defendant Computer/Dynamics had no market power. *Id.* at 675–77. There was no mention of the efficiencies from the tie. The third case, *Caldera, Inc. v. Microsoft Corp.*, 72 F. Supp. 2d 1295 (D. Utah 1999), involved a complaint that the technological integration of MS–DOS and Windows 3.1 into Windows 95 constituted a per se tying violation. The court formulated the "single product" issue in terms of whether the tie constituted a technological improvement, ultimately concluding that Microsoft was not entitled to summary judgment on that issue. *Id.* at 1322–28.

The software case that bears the greatest resemblance to that at bar is, not surprisingly, *Microsoft II*, 147 F.3d 935, where we examined the bundling of IE with Windows 95. But the issue there was whether the bundle constituted an "integrated product" as the term was used in a 1994 consent decree between the Department of Justice and Microsoft. *Id.* at 939. We did not consider whether Microsoft's bundling should be condemned as per se illegal. We certainly did not make any finding that bundling IE with Windows had "no purpose except stifling of competition," *White Motor*, 372 U.S. at 263, an important consideration in defining the scope of any of antitrust law's per se rules, *see Cont'l T.V.*, 433 U.S. at 57–59. While we believed our interpretation of the term "integrated product" was consistent with the test for separate products under tying law, we made clear that the "antitrust question is of course distinct." *Microsoft II*, 147 F.3d at 950 n.14. We even cautioned that our conclusion that IE and Windows 95 were integrated was "subject to reexamination on a more complete record." *Id.* at 952. To the extent that the decision completely disclaimed judicial capacity to evaluate "high-tech product design," *id.*, it cannot be said to conform to prevailing antitrust doctrine (as opposed to resolution of the decree-interpretation issue then before us). In any case, mere review of asserted breaches of a consent decree hardly constitutes enough "experience" to warrant application of per se analysis. *See Broad. Music*, 441 U.S. at 10–16 (refusing to apply per se analysis to defendant's blanket licenses even though those licenses had been thoroughly investigated by the Department of Justice and were the subject of a consent decree that had been reviewed by numerous courts).

While the paucity of cases examining software bundling suggests a high risk that per se analysis may produce inaccurate results, the nature of the platform software market affirmatively suggests that per se rules might stunt valuable innovation. We have in mind two reasons.

First, as we explained in the previous section, the separate-products test is a poor proxy for net efficiency from newly integrated products. Under per se analysis the first firm to merge previously distinct functionalities (*e.g.*, the inclusion of starter motors in automobiles) or to eliminate entirely the need for a second function (*e.g.*, the invention of the stain-resistant carpet) risks being condemned as having tied two separate products because at the moment of integration there will appear to be a robust "distinct" market for the tied product. *See* 10 AREEDA ET AL., ANTITRUST LAW ¶ 1746, at 224. Rule of reason analysis, however, affords the first mover an opportunity to demonstrate that an efficiency gain from its "tie" adequately offsets any distortion of consumer choice. *See Grappone, Inc. v. Subaru of New England, Inc.*, 858 F.2d 792, 799 (1st Cir. 1988) (Breyer, J.); *see also Town Sound & Custom Tops, Inc. v. Chrysler Motor Corp.*, 959 F.2d 468, 482 (3d Cir. 1992); *Kaiser Aluminum & Chem. Sales, Inc. v. Avondale Shipyards, Inc.*, 677 F.2d 1045, 1048–49 n.5 (5th Cir. 1982).

The failure of the separate-products test to screen out certain cases of productive integration is particularly troubling in platform software markets such as that in which the defendant competes. Not only is integration common in such markets, but it is common among firms without market power. We have already reviewed evidence that nearly all competitive OS vendors also bundle browsers. Moreover, plaintiffs do not dispute that OS vendors can and do incorporate basic internet plumbing and other useful functionality into their OSs. *See* Direct Testimony of Richard Schmalensee ¶ 508, *reprinted in* 7 J.A. at 4462–64 (disk defragmentation, memory management, peer-to-peer networking or file sharing); 11/19/98 am Tr. at 82–83 (trial testimony of Frederick Warren-Boulton), *reprinted in* 10 J.A. at 6427–28 (TCP/IP stacks). Firms without market power have no incentive to package different pieces of software together unless there are efficiency gains from doing so. The ubiquity of bundling in competitive platform software markets should give courts reason to pause before condemning such behavior in less competitive markets.

Second, because of the pervasively innovative character of platform software markets, tying in such markets may produce efficiencies that courts have not previously encountered and thus the Supreme Court had not factored into the per se rule as originally conceived. For example, the bundling of a browser with OSs enables an independent software developer to count on the presence of the browser's APIs, if any, on consumers' machines and thus to omit them from its own package. *See* Direct Testimony of Richard Schmalensee ¶¶ 230–31, 234, *reprinted* in 7 J.A. at 4309–11, 4312; Direct Testimony of Michael Devlin ¶¶ 12–21, *reprinted in* 5 J.A. at 3525–29; *see also Findings of Fact* ¶ 2. It is true that software developers can bundle the browser APIs they need with their own products, *see id.* ¶ 193, but that may force consumers to pay twice for the same API if it is bundled with two different software programs. It is also true that OEMs can include APIs with the computers they sell, *id.*, but diffusion of uniform APIs by that route may be inferior. First, many OEMs serve special subsets of Windows consumers, such as home or corporate or academic users. If just one of these OEMs decides not to bundle an API because it does not benefit enough of its clients, ISVs that use that API might have to bundle it with every copy of their program. Second, there may be a substantial lag before all OEMs bundle the same set of APIs—a lag inevitably aggravated by the first phenomenon. In a field where programs change very rapidly, delays in the spread of a necessary element (here, the APIs) may be very costly. Of course, these arguments may not justify Microsoft's decision to bundle APIs in this case, particularly because Microsoft did not merely bundle with Windows the APIs from IE, but an entire browser application (sometimes even without APIs, *see id.*).

A justification for bundling a component of software may not be one for bundling the entire software package, especially given the malleability of software code. *See id.* ¶¶ 162–63; 12/9/98 am Tr. at 17 (trial testimony of David Farber); 1/6/99 am Tr. at 6–7 (trial testimony of Franklin Fisher), *reprinted in* 11 J.A. at 7192–93; Direct Testimony of Joachim Kempin ¶ 286, *reprinted in* 6 J.A. at 3749. Furthermore, the interest in efficient API diffusion obviously supplies a far stronger justification for simple price-bundling than for Microsoft's contractual or technological bars to subsequent *removal* of functionality. But our qualms about redefining the boundaries of a defendant's product and the possibility of consumer gains from simplifying the work of applications developers makes us question any hard and fast approach to tying in OS software markets.

There may also be a number of efficiencies that, although very real, have been ignored in the calculations underlying the adoption of a per se rule for tying. We fear that these efficiencies are common in technologically dynamic markets where product development is especially unlikely to follow an easily foreseen linear pattern. Take the following example from *ILC Peripherals*, 448 F. Supp. 228, a case concerning the evolution of disk drives for computers. When IBM first introduced such drives in 1956, it sold an integrated product that contained magnetic disks and disk heads that read and wrote data onto disks. *Id.* at 231. Consumers of the drives demanded two functions—to store data and to access it all at once. In the first few years consumers' demand for storage increased rapidly, outpacing the evolution of magnetic disk technology. To satisfy that demand IBM made it possible for consumers to remove the magnetic disks from drives, even though that meant consumers would not have access to data on disks removed from the drive. This componentization enabled makers of computer peripherals to sell consumers removable disks. *Id.* at 231–32. Over time, however, the technology of magnetic disks caught up with demand for capacity, so that consumers needed few removable disks to store all their data. At this point IBM reintegrated disks into their drives, enabling consumers to once again have immediate access to all their data without a sacrifice in capacity. *Id.* A manufacturer of removable disks sued. But the District Court found the tie justified because it satisfied consumer demand for immediate access to all data, and ruled that disks and disk heads were one product. *Id.* at 233. A court hewing more closely to the truncated analysis contemplated by *Northern Pacific Railway* would perhaps have overlooked these consumer benefits.

These arguments all point to one conclusion: we cannot comfortably say that bundling in platform software markets has so little "redeeming virtue," *N. Pac. Ry.*, 356 U.S. at 5, and that there would be so "very little loss to society" from its ban, that "an inquiry into its costs in the individual case [can be] considered [ ] unnecessary." *Jefferson Parish*, 466 U.S. at 33–34 (O'Connor, J., concurring). We do not have enough empirical evidence regarding the effect of Microsoft's practice on the amount of consumer surplus created or consumer choice foreclosed by the integration of added functionality into platform software to exercise sensible judgment regarding that entire class of behavior. (For some issues we have no data.) "We need to know more than we do about the actual impact of these arrangements on competition to decide whether they . . . should be classified as *per se* violations of the Sherman Act." *White Motor*, 372 U.S. at 263. Until then, we will heed the wisdom that "easy labels do not always supply ready answers," *Broad. Music*, 441 U.S. at 8, and vacate the District Court's finding of per se tying liability under Sherman Act § 1. We remand the case for evaluation of Microsoft's tying arrangements under the rule of reason. *See Pullman–Standard v. Swint*, 456 U.S. 273, 292 (1982) ("[W]here findings are infirm because of an erroneous view of the law, a remand is the proper course unless the record permits only one resolution of the factual issue."). That rule more freely permits consideration of the benefits of bundling in software markets, particularly those for OSs, and a balancing of these benefits against the costs to consumers whose ability to make direct price/quality tradeoffs in the tied market may have been impaired. *See Jefferson Parish*, 466 U.S. at 25 nn.41–42 (noting that per se rule does not broadly permit consideration of procompetitive justifications); *id.* at 34–35 (O'Connor, J., concurring); *N. Pac. Ry.*, 356 U.S. at 5.

Our judgment regarding the comparative merits of the per se rule and the rule of reason is confined to the tying arrangement before us, where the tying product is software whose major purpose is to serve as a platform for third-party applications and the tied product is complementary software functionality. While our reasoning may at times appear to have broader force, we do not have the confidence to speak to facts outside the record, which contains scant discussion of software integration generally. Microsoft's primary justification for bundling IE APIs is that their inclusion with Windows increases the value of third-party software (and Windows) to consumers. *See* Appellant's Opening Br. at 41–43. Because this claim applies with distinct force when the tying product is *platform* software, we have no present basis for finding the per se rule inapplicable to software markets generally. Nor should we be interpreted as setting a precedent for switching to the rule of reason every time a court identifies an efficiency justification for a tying arrangement. Our reading of the record suggests merely that integration of new functionality into platform software is a common practice and that wooden application of per se rules in this litigation may cast a cloud over platform innovation in the market for PCs, network computers and information appliances.

C. *On Remand*

Should plaintiffs choose to pursue a tying claim under the rule of reason, we note the following for the benefit of the trial court:

First, on remand, plaintiffs must show that Microsoft's conduct unreasonably restrained competition. Meeting that burden "involves an inquiry into the actual effect" of Microsoft's conduct on competition in the tied good market, *Jefferson Parish*, 466 U.S. at 29, the putative market for browsers. To the extent that certain aspects of tying injury may depend on a careful definition of the tied good market and a showing of barriers to entry other than the tying arrangement itself, plaintiffs would have to establish these points. *See Jefferson Parish*, 466 U.S. at 29 ("This competition [among anesthesiologists] takes place in a market that has not been defined."); *id.* at 29 n.48 ("[N]either the District Court nor the Court of Appeals made any findings concerning the contract's effect on entry barriers."). But plaintiffs were required—and had every incentive—to provide both a definition of the browser market and barriers to entry to that market as part of their § 2 attempted monopolization claim; yet they failed to do so. *See supra* Section III. Accordingly, on remand of the § 1 tying claim, plaintiffs will be precluded from arguing any theory of harm that depends on a precise definition of browsers or barriers to entry (for example, network effects from Internet protocols and extensions embedded in a browser) other than what may be implicit in Microsoft's tying arrangement.

Of the harms left, plaintiffs must show that Microsoft's conduct was, on balance, anticompetitive. Microsoft may of course offer procompetitive justifications, and it is plaintiffs' burden to show that the anticompetitive effect of the conduct outweighs its benefit.

Second, the fact that we have already considered some of the behavior plaintiffs allege to constitute tying violations in the monopoly maintenance section does not resolve the § 1 inquiry. The two practices that plaintiffs have most ardently claimed as tying violations are, indeed, a basis for liability under plaintiffs' § 2 monopoly maintenance claim. These are Microsoft's refusal to allow OEMs to uninstall IE or remove it from the Windows desktop, *Findings of Fact* ¶¶ 158, 203, 213, and its removal of the IE entry from the Add/Remove Programs utility in Windows 98, *id.* ¶ 170. *See supra* Section II.B. In order for the District Court to conclude these practices also constitute § 1 tying violations, plaintiffs must demonstrate that their benefits—if any, *see supra* Sections II.B.1.b and II.B.2.b; *Findings of Fact* ¶¶ 176, 186, 193—are outweighed by the harms in the *tied product* market. *See Jefferson Parish*, 466 U.S. at 29. If the District Court is convinced of net harm, it must then consider whether any additional remedy is necessary.

In Section II.B we also considered another alleged tying violation—the Windows 98 override of a consumer's choice of default web browser. We concluded that this behavior does not provide a distinct basis for § 2 liability because plaintiffs failed to rebut Microsoft's proffered justification by demonstrating that harms in the operating system market outweigh Microsoft's claimed benefits. *See supra* Section II.B. On remand, however, although Microsoft may offer the same procompetitive justification for the override, plaintiffs must have a new opportunity to rebut this claim, by demonstrating that the anticompetitive effect in the *browser* market is greater than these benefits.

Finally, the District Court must also consider an alleged tying violation that we did not consider under § 2 monopoly maintenance: price bundling. First, the court must determine if Microsoft indeed price bundled—that is, was Microsoft's charge for Windows and IE higher than its charge would have been for Windows alone? This will require plaintiffs to resolve the tension between *Findings of Fact* ¶ ¶ 136–37, which Microsoft interprets as saying that no part of the bundled price of Windows can be attributed to IE, and *Conclusions of Law*, at 50, which says the opposite. *Compare* Direct Testimony of Paul Maritz ¶ ¶ 37, 296, *reprinted in* 6 J.A. at 3656, 3753–54 (Microsoft did not "charge separately" for IE, but like all other major OS vendors included browsing software at "no extra charge"), *with* GX 202 at MS7 004343, esp. 004347, *reprinted in* 22 J.A. at 14459, esp. 14463 (memo from Christian Wildfeuer describing focus group test used to price Windows 98 with IE 4), *and* GX 1371 at MS7 003729–30, 003746, 003748, esp. 003750, *reprinted in* 15 J.A. at 10306–07, 10323, 10325, esp. 10327 (Windows 98 pricing and marketing memo), *and Findings of Fact* ¶ 63 (identifying GX 202 as the *basis* for Windows 98 pricing).

If there is a positive price increment in Windows associated with IE (we know there is no claim of price predation), plaintiffs must demonstrate that the anticompetitive effects of Microsoft's price bundling outweigh any procompetitive justifications the company provides for it. In striking this balance, the District Court should consider, among other things, indirect evidence of efficiency provided by "the competitive fringe." *See supra* Section IV.A. Although this inquiry may overlap with the separate-products screen under the per se rule, that is not its role here. Because courts applying the rule of reason are free to look at both direct and indirect evidence of efficiencies from a tie, there is no need for a screening device as such; thus the separate-products inquiry serves merely to classify arrangements as subject to tying law, as opposed to, say, liability for exclusive dealing. *See Times–Picayune*, 345 U.S. at 614 (finding a single product and then turning to a general rule of reason analysis under § 1, though not using the term "tying"); *Foster v. Md. State Sav. & Loan Ass'n*, 590 F.2d 928, 931, 933 (D.C. Cir. 1978), *cited in Jefferson Parish*, 466 U.S. at 40 (O'Connor, J., concurring) (same); *see also Chawla v. Shell Oil Co.*, 75 F. Supp. 2d 626, 635, 643–44 (S.D. Tex. 1999) (considering a rule of reason tying claim after finding a single product under the per se rule); *Montgomery County Ass'n of Realtors v. Realty Photo Master Corp.*, 783 F. Supp. 952, 961 & n.26 (D. Md. 1992), *aff'd mem.* 993 F.2d 1538 (4th Cir. 1993) (same).

If OS vendors without market power also sell their software bundled with a browser, the natural inference is that sale of the items as a bundle serves consumer demand and that unbundled sale would not, for otherwise a competitor could profitably offer the two products separately and capture sales of the tying good from vendors that bundle. *See* 10 AREEDA ET AL., ANTITRUST LAW ¶ 1744b, at 197–98. It does appear that most if not all firms have sold a browser with their OSs at a bundled price, beginning with IBM and its OS/2 Warp OS in September 1994, *Findings of Fact* ¶ 140; *see also* Direct Testimony of Richard Schmalensee ¶ 212, *reprinted in* 7 J.A. at 4300–01, and running to current versions of Apple's Mac OS, Caldera and Red Hat's Linux OS, Sun's Solaris OS, Be's BeOS, Santa Cruz Operation's UnixWare, Novell's NetWare OS, and others, *see Findings of Fact* ¶ 153; Direct Testimony of Richard Schmalensee ¶ ¶ 215–23, 230, esp. table 5, *reprinted in* 7 J.A. at 4302–05, 4310; Direct Testimony of James Allchin ¶ ¶ 261–77, *reprinted in* 5 J.A. at 3384–92.

Of course price bundling by competitive OS makers would tend to exonerate Microsoft only if the sellers in question sold their browser/OS combinations *exclusively* at a bundled price. If a competitive seller offers a discount for a browserless version, then—at least as to *its* OS and browser—the gains from bundling are outweighed by those from separate choice. The evidence on discounts appears to be in conflict. *Compare* Direct Testimony of Richard Schmalensee ¶ 241, *reprinted in* 7 J.A. at 4315, *with* 1/6/99 pm Tr. at 42 (trial testimony of Franklin Fisher). If Schmalensee is correct that nearly all OS makers do not offer a discount, then the harm from tying—obstruction of direct consumer choice—would be theoretically created by virtually all sellers: a customer who would prefer an alternate browser is forced to pay the full price of that browser even though its value to him is only the increment in value over the bundled browser. (The result is similar to that from non-removal, which forces consumers who want the alternate browser to surrender disk space taken up by the unused, bundled browser.) If the failure to offer a price discount were universal, any impediment to direct consumer choice created by Microsoft's price-bundled sale of IE with Windows would be matched throughout the market; yet these OS suppliers on the competitive fringe would have evidently found this price bundling on balance efficient. If Schmalensee's assertions are ill-founded, of course, no such inference could be drawn.

V. Trial Proceedings and Remedy

Microsoft additionally challenges the District Court's procedural rulings on two fronts. First, with respect to the trial phase, Microsoft proposes that the court mismanaged its docket by adopting an expedited trial schedule and receiving evidence through summary witnesses. Second, with respect to the remedies decree, Microsoft argues that the court improperly ordered that it be divided into two separate companies. Only the latter claim will long detain us. The District Court's trial-phase procedures were comfortably within the bounds of its broad discretion to conduct trials as it sees fit. We conclude, however, that the District Court's remedies decree must be vacated for three independent reasons: (1) the court failed to hold a remedies-specific evidentiary hearing when there were disputed facts; (2) the court failed to provide adequate reasons for its decreed remedies; and (3) this Court has revised the scope of Microsoft's liability and it is impossible to determine to what extent that should affect the remedies provisions.

A. Factual Background

On April 3, 2000, the District Court concluded the liability phase of the proceedings by the filing of its Conclusions of Law holding that Microsoft had violated §§ 1 and 2 of the Sherman Act. The court and the parties then began discussions of the procedures to be followed in the imposition of remedies. Initially, the District Court signaled that it would enter relief only after conducting a new round of proceedings. In its Conclusions of Law, the court stated that it would issue a remedies order "following proceedings to be established by further Order of the Court." *Conclusions of Law*, at 57. And, when during a post-trial conference, Microsoft's counsel asked whether the court "contemplate[d] further proceedings," the judge replied, "Yes. Yes. I assume that there would be further proceedings." 4/4/00 Tr. at 8–9, 11, *reprinted in* 4 J.A. at 2445–46, 2448. The District Court further speculated that those proceedings might "replicate the procedure at trial with testimony in written form subject to cross-examination." *Id.* at 11, *reprinted in* 4 J.A. at 2448.

On April 28, 2000, plaintiffs submitted their proposed final judgment, accompanied by six new supporting affidavits and several exhibits. In addition to a series of temporary conduct restrictions, plaintiffs proposed that Microsoft be split into two independent corporations, with one continuing Microsoft's operating systems business and the other undertaking the balance of Microsoft's operations. Plaintiffs' Proposed Final Judgment at 2–3, *reprinted in* 4 J.A. at 2473–74. Microsoft filed a "summary response" on May 10, contending both that the proposed decree was too severe and that it would be impossible to resolve certain remedies-specific factual disputes "on a highly expedited basis." Defendant's Summary

Response at 6–7, *reprinted in* 4 J.A. at 2587–88. Another May 10 submission argued that if the District Court considered imposing plaintiffs' proposed remedy, "then substantial discovery, adequate time for preparation and a full trial on relief will be required." Defendant's Position as to Future Proceedings at 2, *reprinted in* 4 J.A. at 2646.

After the District Court revealed during a May 24 hearing that it was prepared to enter a decree without conducting "any further process," 5/24/00 pm Tr. at 33, *reprinted in* 14 J.A. at 9866, Microsoft renewed its argument that the underlying factual disputes between the parties necessitated a remedies-specific evidentiary hearing. In two separate offers of proof, Microsoft offered to produce a number of pieces of evidence, including the following:

- Testimony from Dr. Robert Crandall, a Senior Fellow at the Brookings Institution, that divestiture and dissolution orders historically have "failed to improve economic welfare by reducing prices or increasing output." Defendant's Offer of Proof at 2, *reprinted in* 4 J.A. at 2743.
- Testimony from Professor Kenneth Elzinga, Professor of Economics at the University of Virginia, that plaintiffs' proposed remedies would not induce entry into the operating systems market. *Id.* at 4, *reprinted in* 4 J.A. at 2745.
- Testimony from Dean Richard Schmalensee, Dean of MIT's Sloan School of Management, that dividing Microsoft likely would "harm consumers through higher prices, lower output, reduced efficiency, and less innovation" and would "produce immediate, substantial increases in the prices of both Windows and Office." *Id.* at 8, *reprinted in* 4 J.A. at 2749. Indeed, it would cause the price of Windows to triple. *Id.*
- Testimony from Goldman, Sachs & Co. and from Morgan Stanley Dean Witter that dissolution would adversely affect shareholder value. *Id.* at 17, 19, *reprinted in* 4 J.A. at 2758, 2760.

- Testimony from Microsoft Chairman Bill Gates that dividing Microsoft "along the arbitrary lines proposed by the Government" would devastate the company's proposed Next Generation Windows Services platform, which would allow software developers to write web-based applications that users could access from a wide range of devices. *Id.* at 21–22, *reprinted in* 4 J.A. at 2762–63.
- Testimony from Steve Ballmer, Microsoft's President and CEO, that Microsoft is organized as a unified company and that "there are no natural lines along which Microsoft could be broken up without causing serious problems." *Id.* at 23, *reprinted in* 4 J.A. at 2764.
- Testimony from Michael Capellas, CEO of Compaq, that splitting Microsoft in two "will make it more difficult for OEMs to provide customers with the tightly integrated product offerings they demand" in part because "complementary products created by unrelated companies do not work as well together as products created by a single company." Defendant's Supplemental Offer of Proof at 2, *reprinted in* 4 J.A. at 2823.

Over Microsoft's objections, the District Court proceeded to consider the merits of the remedy and on June 7, 2000 entered its final judgment. The court explained that it would not conduct "extended proceedings on the form a remedy should take," because it doubted that an evidentiary hearing would "give any significantly greater assurance that it will be able to identify what might be generally regarded as an optimum remedy." *Final Judgment*, at 62. The bulk of Microsoft's proffered facts were simply conjectures about future events, and "[i]n its experience the Court has found testimonial predictions of future events generally less reliable even than testimony as to historical fact, and cross-examination to be of little use in enhancing or detracting from their accuracy." *Id.* Nor was the court swayed by Microsoft's "profession of surprise" at the possibility of structural relief. *Id.* at 61. "From the inception of this case Microsoft knew, from well-established Supreme Court precedents dating from the beginning of the last century, that a mandated divestiture was a possibility, if not a probability, in the event of an adverse result at trial." *Id.*

The substance of the District Court's remedies order is nearly identical to plaintiffs' proposal. The decree's centerpiece is the requirement that Microsoft submit a proposed plan of divestiture, with the company to be split into an "Operating Systems Business," or "OpsCo," and an "Applications Business," or "AppsCo." *Final Judgment*, Decree §§ 1.a, 1.c.i, at 64. OpsCo would receive all of Microsoft's operating systems, such as Windows 98 and Windows 2000, while AppsCo would receive the remainder of Microsoft's businesses, including IE and Office. The District Court identified four reasons for its "reluctant[ ]" conclusion that "a structural remedy has become imperative." *Id.* at 62. First, Microsoft "does not yet concede that any of its business practices violated the Sherman Act." *Id.* Second, the company consequently "continues to do business as it has in the past." *Id.* Third, Microsoft "has proved untrustworthy in the past." *Id.* And fourth, the Government, whose officials "are by reason of office obliged and expected to consider—and to act in—the public interest," won the case, "and for that reason alone have some entitlement to a remedy of their choice." *Id.* at 62–63.

The decree also contains a number of interim restrictions on Microsoft's conduct. For instance, Decree § 3.b requires Microsoft to disclose to third-party developers the APIs and other technical information necessary to ensure that software effectively interoperates with Windows. *Id.* at 67. "To facilitate compliance," § 3.b further requires that Microsoft establish "a secure facility" at which third-party representatives may "study, interrogate and interact with relevant and necessary portions of [Microsoft platform software] source code." *Id.* Section 3.e, entitled "Ban on Exclusive Dealing," forbids Microsoft from entering contracts which oblige third parties to restrict their "development, production, distribution, promotion or use of, or payment for" non-Microsoft platform-level software. *Id.* at 68. Under Decree § 3.f—"Ban on